U.S. Department of Agriculture
Natural Resources Conservation Service

MT-ENG-230
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GATED PIPE DESIGN WORKSHEET

Land user _____ Field Office _____
Job description _____
Location _____
Planner _____ Date _____ Checked by _____ Date _____

STATIC HEAD

Static head = (Water surface elevation or pressure head elevation) – Low elevation
= _____ – _____ = _____ ft

Static pressure = (static head) x 0.433
= _____ x 0.433 = _____ psi

FRICTION LOSS

Type of gated pipe: (Plastic___) (Aluminum_____), Pipe size_____ inches
Type of supply pipe_____ Size of supply pipe _____ inches

Number of open gates_____
Gate spacing_____inches
Flow rate per gate_____gpm, Total flow rate_____ gpm

Hf = L/100 x f/100 x F Hm = Km x V^2 /64.4

Segment	Length L (ft)	L/100	Pipe Friction Loss				Minor Losses			
			f/100 (1)	F (2)	Hf (ft)	V (ft/sec)	Km (3)	$V^2/2g$ (ft)	Hm (ft)	Type of Minor Loss
Supply Pipe H1										
Ungated Gated H2										
Gated Closed H3										
Hated Open H4										
				Total Hf		ft		Hm		ft

(1) Friction loss factor from tables in feet/100 feet [see Page 15-15 of the Engineering Field Manual (also NEH, Part 650).
(2) Reduction coefficient for gate openings from table [see Exhibit 15-4 of the Engineering Field Manual (also NEH, Part 650)].
(3) Head loss coefficients from Exhibit 3-8, Engineering Field Manual (also NEH, Part 650).

Note: See Chapter 7 of the Montana Irrigation Manual for system types and terminology.

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OPERATING HEAD

Operating head at beginning of open gate segment:

HB = WSEL – Hf1 – Hm1 – Hf2 – Hm2 – Hf3 – Hm3 – ELB

HB = _____ = _____ ft

Pressure at beginning of open segment:

PB = HB x 0.433 = _____ x 0.433 = _____ psi

Operating head at end of open gate segment:

HE = WSEL – Hf1 – Hm1 – Hf2 – Hm2 – Hf3 – Hm3 – Hf4 – Hm4 – ELE

HE = _____ = _____ ft

Pressure at end of open segment:

PE = HE x 0.433 = _____ x 0.433 = _____ psi

COMMENTS OR OTHER CALCULATIONS